

Notice of Allowability

Application No.

10/729,637

Examiner

Cuong V. Luu

Applicant(s)

YU, JIUN-DER

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 8/22/2006.
2. ☒ The allowed claim(s) is/are 1-19.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 6/7/06
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

Claims 1-19 are pending. Claims 1-19 have been examined. Claims 1-19 have been allowed.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The paragraphs 0001 and 0002 in the specification have been amended as follows:

[0001] This application claims priority under 35 U.S.C. § 120 as a continuation-in-part of application Ser. No. 10/390,239, filed on Mar. 14, 2003, now U.S. Patent number 7,117,138, and entitled: "Coupled Quadrilateral Grid Level Set Scheme for Piezoelectric Ink-Jet Simulation," the disclosure of which is incorporated by reference herein.

[0002] This application is also related to the following applications: application Ser. No. 10/652,386, filed Aug. 29, 2003 and entitled "Consistent Back Pressure for Piezoelectric Ink-Jet Simulation" and application Ser. No. 10/105,138, filed on Mar. 22, 2002, now U.S. Patent number 7,085,695, and entitled "A Slipping Contact Line Model and the Mass-Conservative Level Set Implementation for Ink-Jet Simulation." The disclosure of each of these related applications is incorporated by reference herein.

Allowable Subject Matter

Claims 1-19 are allowed. The following is an examiner's statement of reasons for allowance:

1. As per claim 1, the closest prior arts, the applicants' admitted prior art, Trebotich et al, and Tsukanov et al, teach a method for simulating and analyzing fluid that flows through, and is ejected from a channel having a boundary between a first fluid that flows through, and is ejected from, the channel and a second fluid, the method comprising:
 - simulating the ejection of the first fluid from the channel using a level set projection algorithm that includes
 - (1) creating a quadrilateral grid in a physical space, comprising a plurality of nodes at the intersections of the quadrilateral grid,
 - (2) calculating a transformation matrix for transforming equations derived with respect to the quadrilateral grid for application to a uniform square grid in a computational space, the uniform square grid comprising a plurality of nodes at the intersections of the uniform square grid,
 - (3) solving equations governing the first and second fluids including creating a level set representative of the boundary, and
 - (4) re-distancing the level set, periodically during the simulation, by performing bi-cubic interpolation.

However, in teaching re-distancing the level set by performing bi-cubic interpolation the prior arts do not teach performing **selectively reduced** bi-cubic interpolation as defined in the specification on page 9, section III, as recited by the claimed invention.

2. As per claim 7, the closest prior arts, the applicants' admitted prior art, Trebotich et al, and Tsukanov et al, teach an apparatus for simulating and analyzing fluid that flows through, and is ejected from a channel having a boundary between a first fluid that flows through, and is ejected from, the channel and a second fluid, the apparatus comprising:

means for simulating the ejection of the first fluid from the channel using a level set projection algorithm that includes modules configured to

(1) create a quadrilateral grid in a physical space, comprising a plurality of nodes at the intersections of the quadrilateral grid,

(2) calculate a transformation matrix for transforming equations derived with respect to the quadrilateral grid for application to a uniform square grid in a computational space, the uniform square grid comprising a plurality of nodes at the intersections of the uniform square grid,

(3) solve equations governing the first and second fluids including creating a level set representative of the boundary, and

(4) re-distance the level set, periodically during the simulation, by performing bi-cubic interpolation.

However, in teaching re-distancing the level set by performing bi-cubic interpolation the prior arts do not teach performing selectively reduced bi-cubic interpolation as defined in the specification on page 9, section III, as recited by the claimed invention.

3. As per claim 14, the closest prior arts, the applicants' admitted prior art, Trebotich et al, and Tsukanov et al, teach a machine-readable medium having a program of instructions for directing a machine to perform a method for simulating and analyzing fluid that flows through, and is ejected from a channel having a boundary between a first fluid that flows

through, and is ejected from, the channel and a second fluid, the program of instructions comprising instructions for:

simulating the ejection of the first fluid from the channel using a level set projection algorithm that includes instructions for

(1) creating a quadrilateral grid in a physical space, comprising a plurality of nodes at the intersections of the quadrilateral grid,

(2) calculating a transformation matrix for transforming equations derived with respect to the quadrilateral grid for application to a uniform square grid in a computational space, the uniform square grid comprising a plurality of nodes at the intersections of the uniform square grid,

(3) solving equations governing the first and second fluids including creating a level set representative of the boundary, and

(4) re-distancing the level set, periodically during the simulation, by performing bi-cubic interpolation.

However, in teaching re-distancing the level set by performing bi-cubic interpolation the prior arts do not teach performing selectively reduced bi-cubic interpolation as defined in the specification on page 9, section III, as recited by the claimed invention.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Art Unit: 2128

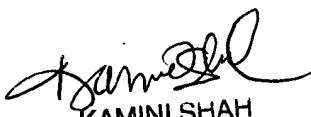
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cuong V. Luu whose telephone number is 571-272-8572. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah, can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. An inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CVL


KAMINI SHAH
SUPERVISORY PATENT EXAMINER